Notice No.4

Rules and Regulations for the Classification of Naval Ships, January 2022

The status of this Rule set is amended as shown and is now to be read in conjunction with this and prior Notices. Any corrigenda included in the Notice are effective immediately.

Please note that corrigenda amends to paragraphs, Tables and Figures are not shown in their entirety.

Issue date: June 2022

Amendments to	Effective date	IACS/IMO implementation (if applicable)
Volume 1, Part 4, Chapter 2, Section 10	Corrigendum	N/A
Volume 1, Part 4, Chapter 3, Section 2	Corrigendum	N/A
Volume 1, Part 5, Chapter 4, Section 3	Corrigenda	N/A
Volume 1, Part 6, Chapter 2, Sections 2, 3 & 4	Corrigenda	N/A
Volume 1, Part 6, Chapter 3, Sections 3 & 10	Corrigenda	N/A
Volume 1, Part 6, Chapter 5, Section 2	Corrigendum	N/A
Volume 1, Part 6, Chapter 6, Section 6	Corrigenda	N/A
Volume 2, Part 9, Chapter 3, Section 8	Corrigendum	N/A

Volume 1, Part 4, Chapter 2 Military Load Specification

■ *Section 10* **Aircraft operations**

10.7 Determination of λ for helicopters

10.7.1 The reaction factor can be calculated by simulation, testing or estimated from the following formulae:

$$\lambda = \frac{V^2_L}{2g(\eta_T \delta_T + \eta_S \delta_S)} + \frac{(1-f_L)(\delta_T + \delta_S)}{\eta_T \delta_T + \eta_S \delta_S}$$

where

λ, δ_S, δ_T, V_L, η_T, η_S are defined in Vol 1, Pt 4, Ch 2, 10.6 Determination of λ for fixed wing aircraft

f_L = the percentage of lift carried by the rotors at the time of landing typically 66 per cent.
g = is defined in *Vol 1, Pt 5, Ch 3, 1.3 Symbols and definitions.*

Volume 1, Part 4, Chapter 3 Special Features

■ *Section 2* **Vehicle decks and fixed ramps**

2.3 Deck plating

Table 3.2.1 Deck plate thickness calculation

Symbols	Expression
...	λ = 1,25 for harbour conditions = (1 + 0,7n) for sea ~~gong~~ going conditions

Volume 1, Part 5, Chapter 4 Global Design Loads

■ *Section 3* **Global hull girder loads**

3.3 Vertical wave bending moments

3.3.4 The stern flare area, A_{SF}, is illustrated in *Figure 4.3.1 Deviation of bow and stern flare areas* and is to be derived as follows:
$A_{SF} = A_{US} – A_{LS}$ m^2
where

$T_{C,L}$ = ~~T — L f2 m.~~ $\boldsymbol{T}-\frac{\boldsymbol{Lf}}{\boldsymbol{2}}$

For ships with tumblehome in the stern region, the maximum breadth at any waterline less than $T_{C,U}$ is to be used in the calculation of A_{US}. The effects of appendages including bossings are to be ignored in the calculation of ALS.

3.9 Dynamic bending moments and associated shear forces

3.9.3 The dynamic bending moment, due to a high speed planning craft landing on a wave crest amidships, at any position along the ship, is to be calculated using the following expression:

$M_{DW} = \boldsymbol{F}_{\mathbf{df}}\ \boldsymbol{D}_{\mathbf{df}}\ \ \boldsymbol{D}_{\mathbf{df}}|\boldsymbol{M}_{\mathbf{d}}|$ ~~kN/m~~ kNm

where

$|M_D| = 51\Delta L_R\left(16a_{op}-4a_{bp}-17a_{sp}-5\right) \text{ x } 10^{-3}$ ~~kN/m~~ kNm

Volume 1, Part 6, Chapter 2 Design Tools

■ *Section 2*
Structural Design

2.6 Determination of span length

2.6.1 The effective span length, l_e, of a stiffening member is generally less than the overall length, l, by an amount which depends on the design of the end connections. The span points, between which the value of l_e is measured, are to be determined as follows:

(b) For primary support members:
The span point is to be taken at a point distant, b_s, from the end of the member

$\cancel{b_s = b_b\left(1-\frac{d_w}{d_b}\right)}$ $\quad b_s = b_b\left(l-\frac{d_w}{d_b}\right)$

where b_s, b_b, d_w and ~~d_s~~ d_b are as shown in *Figure 2.2.5 Definition of span points*

■ *Section 3*
Buckling

3.3 Plate panel buckling requirements

Table 2.3.2 Buckling stress of plate panels

Mode	Elastic buckling stress, N/mm² *see* Note
(a) Uni-axial compression: (i) Long narrow panels, loaded on the narrow edge	~~$A_R \geq 1$~~ $A_R \geq 1$ $\cancel{\sigma_e = 3{,}62\varphi E\left(\frac{t_p}{b}\right)2}$ $\quad \sigma_e = 3{,}62\phi E\left(\frac{t_p}{b}\right)^2$
(ii) Short broad panels, loaded on the broad edge	$A_R < 1$ $\cancel{\sigma_e = 0{,}9C\varphi\left(\frac{b}{a}+\frac{a}{b}\right)2E\left(\frac{t_p}{b}\right)2}$ $\quad \sigma_e = 0{,}9C\phi\left(\frac{b}{a}+\frac{a}{b}\right)^2 E\left(\frac{t_p}{b}\right)^2$
(b) Pure shear:	$\cancel{\tau_e = 3{,}62\left(1{,}335+\left(\frac{u}{v}\right)2\right)E\left(\frac{t_p}{u}\right)2}$ $\tau_e = 3{,}62\left(1{,}335+\left(\frac{\text{u}}{v}\right)^2\right)E\left(\frac{t_p}{\text{u}}\right)^2$

3.10 Shear buckling of girder webs

3.10.2 The critical shear buckling stress, τ_c, is to be determined using the following formular for τ_e and the Note in *Table 2.3.2 Buckling stress of plate panels*

$\cancel{\tau = 3{,}62\left(1{,}335+\left(\frac{d_w}{1000l_p}\right)2\right)E\left(\frac{t_p}{d_w}\right)2\text{N/mm2}}$ $\quad \tau = 3{,}62\left(1{,}335+\left(\frac{d_w}{1000l_p}\right)^2\right)E\left(\frac{t_w}{d_w}\right)^2$ N/mm²

where

l_{p} = unsupported length of web, in metres
t_w = girder web thickness, in mm

Section 4
Vibration control

4.4 Natural frequency of plate and stiffener combination

4.4.1 The natural frequency of a plate stiffener of constant cross-section in air is given by the following:

$$f_{air} = \cancel{\frac{k_i}{20\,\pi\, l_{b2}}\sqrt{\frac{EI}{m\left(1+\frac{\pi^2 EI}{10^4 l_b^2 GA}\right)}}} \qquad \frac{k_i}{20\,\pi\, l_b^2}\sqrt{\frac{EI}{m\left(1+\frac{\pi^2 EI}{10^4 l_b^2 GA}\right)}}$$

Volume 1, Part 6, Chapter 3 Scantling Determination

Section 3
NS1 scantling determination

3.12 Deck structures

Table 3.3.8 Deck beams (transverse framing)

Location	Modulus, in cm^3
(b) Accommodation decks	$Z = (480K_{1}\,T\,D + 35s\,h_{2}\,l_{e}^{2})k_s \times 10^{-4}$

3.14 Single and double bottom structures

Table 3.3.13 Double bottom construction forward

Symbols
h_{4} = tank head, in metres, as defined in ~~*Table 3.3.6 Deck plating*~~ *Table 3.3.5 Watertight and deep tank bulkhead and deck scantlings*

3.15 Forepeak structure

Table 3.3.15 Magazine bulkhead and deck scantlings

Item and requirement	Magazine bulkheads and decks
Plating	
(1) Plating thickness for plane, symmetrically corrugated and double plate bulkheads	$\cancel{t = 0{,}004s\,\beta\sqrt{h_5 k_5}\,\text{mm}}$ $t = 0{,}004s\,\beta\sqrt{h_5 k_s}$ mm

Section 10
Deck structures

10.3 Deck stiffening

10.3.4 Where the depth of web of a longitudinal girder at the strength deck within $0{,}3L_{R}$ to $0{,}7L_{R}$ exceeds:

(a) $55t_w$ for mild steel members

(b) ~~$55t_w$~~ $65t_w\sqrt{k_L}$ for higher tensile steel members

Additional longitudinal web stiffeners are to be fitted at a spacing not exceeding the value in (a) or (b) as appropriate~~, with a maximum of 65~~$\cancel{t_w \sqrt{k_L}}$ ~~for higher tensile steel members~~. In cases where this spacing is exceeded, the web thickness is, in general, to be suitably increased. Alternative proposals will be considered.

Volume 1, Part 6, Chapter 5 Structural Design Factors

■ *Section 2* Scantling determination for NS1 ships

2.1 Design criteria

2.1.4 Buckling factors for NS1 ships compressive (λσ) and shear (λτ) stresses should be taken from *Vol 1, Pt 6, Ch 5, 3 Scantling determination for NS2 and NS3 ships*.

Volume 1, Part 6, Chapter 6 Materials and Welding Requirements

■ *Section 6* Construction details

6.2 Primary end connections

Table 6.6.1 Minimum thickness of primary members

Item	Requirement
(3) Deck plating forming the upper flange of underdeck girders	Plate thickness not less than $\cancel{\sqrt{\frac{A_f}{1{,}8k}}\ \text{mm}}$ $\sqrt{\frac{A_f}{1{,}8k_s}}$ mm
Symbols	
~~*k*~~ k_S = higher tensile steel factor, *see Vol 1, Pt 6, Ch 2 Design tools*	

Volume 2, Part 9,
Chapter 3
Electrical Power Distribution and Equipment

■ *Section 8*
Electric cables, optical fibre cables and busbar trunking systems (busways)

8.2 Testing

8.2.1 Routine tests, consisting of at least:

(b) high voltage test, *see also* ~~*Vol 2, Pt 9, Ch 10 1 Functional requirements*~~ *Vol 2, Pt 9, Ch 12, 1.1 Testing 1.1.2*;

(e) for optical fibres, an attenuation loss (*see* ~~*Vol 2, Pt 9, 1.4 On-line partial discharge testing of high voltage rotating machines for ship type and mobility systems*~~ *Vol 2, Pt 9, Ch 12, 1.5 Optical Fibre Communications Systems*).

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